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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Veronique SARDOY et al

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FOR: PROCESS FOR PRODUCING A THIN SHEET OF
ULTRA-LOW-CARBON STEEL FOR THE MANUFACTURE
OF DRAWN PRODUCTS FOR PACKAGING AND
THIN SHEET OBTAINED

GROUP ART UNIT: 1742

EXAMINER: Deborah YEE

DECLARATION UNDER 37 C.F.R. §1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Now comes Veronique SARDOY who deposes and states:

1. I am a graduate of PHD and received my diploma degree in the year 1990
2. I have been employed by SOLLAC Lorraine for 13 years as an engineer in the field of metallurgy (R & D)
3. Experiments were carried out on steels of the following chemical compositions:

Table 1: chemical composition

Specimen	C	Mn	P	S	N	Si	Cu	Ni	Cr	Al	Nb	Ti
A	0.0033	0.206	0.01	0.01	0.0023	0.008	0.019	0.017	0.024	0.008	0	0
B	0.0047	0.208	0.011	0.01	0.0065	0.008	0.019	0.016	0.024	0.007	0	0
C	0.0038	0.210	0.011	0.011	0.0081	0.008	0.018	0.017	0.024	0.005	0	0

Table 2 shows the chemical compositions of steels of the present invention R 2116A and R 2115A set forth in Table 1 on page 6 of the present specification.

Table 2: chemical composition

	C	Mn	P	S	N	Si	Cu	Ni	Cr	Al	Nb	Ti PPM
R 2116A	0.0035	0.202	0.013	0.011	0.0035	-	0.008	0.015	0.015	0.008	-	1
R 2115A	0.0032	0.201	0.012	0.011	0.0035	-	0.008	0.016	0.016	0.010	-	1

4. The effect of the nitrogen content on the annealing temperature, grain size and drawing properties were determined by the following tests.

The specimens of Table 1 were subjected to a coiling temperature of 560°C and an annealing duration: first test of 30 seconds at 670°C and a second test of 30 seconds at 700°C.

The temperature of coiling for R 2116A was 570°C and annealing was carried out at 670°C for 30 seconds. Temperature of coiling for R 2115A was 563°C and annealing was carried out at 670°C for 30 seconds. The coiling and annealing temperatures are set forth on Table 3 on page 13 of the present specification.

The results of the tests are set forth at Table 3 below.

Table 3: results

Specimen	Annealing at 670°C			Annealing at 700°C		
	ΔC	r mean	Grain index	ΔC	r mean	Grain index
A	0.05	1.8	10.7	0.04	1.9	9.7
B	-0.31	1.45	recrystallized to 90%	-0.22	1.55	10.4
C	-0.35	1.3	Recrystallized to 85%	-0.27	1.4	10.4
R 2116A	0.08	1.62	10.5	-	-	-
R 2115A	0.12	1.63	10.5	-	-	-

5. Discussion of the Test Results

Specimen A and inventive examples R 2116A and R 2115A demonstrate that steel compositions meeting the requirements of the claims by having $N < 0.006\%$ gave excellent

drawability, (r mean = 1.8 and ΔC = 0.05 along with a grain index of 10.7 for specimen A; r mean = 1.62 and ΔC = 0.08 along with a grain index of 10.5 for R 2116A and an r mean = 1.63 and ΔC = 0.12 along with a grain index of 10.5 for R 2115A). Further, when test specimen A was annealed for 30 seconds at 700°C it retained good drawability but had a grain index of 9.7, which denotes a steel with too coarse a grain, because a grain index under 10 is considered as too coarse. These results are representative of the results to be obtained for compositions containing nitrogen throughout the range $< 0.006\%$, as presently claimed.

Specimens B and C have a composition in which nitrogen is outside the range of the present claims, i.e., $N \geq 0.006\%$. Specimen B has $N = 0.0065\%$ and Specimen C has $N = 0.0081\%$. Specimens B and C exhibit poor drawability characteristics with r mean being smaller than 1.6 and ΔC not being close to 0 along with the fact that the compositions are not fully recrystallized at 670°C. Therefore, grain index can not be measured. Even when Specimens B and C are annealed at 700°C, the drawability characteristics are still poor, but the grain index is improved into the acceptable range.

Sample 3 of EP 0556834A2 has a nitrogen content of 0.009% (see Table 2 on page 9). Therefore, in accordance with the test results for Specimens B and C above, the steel was not fully recrystallized at 670°C after only 10 seconds and the drawability was poor with an r mean = 1.5 and a Δr = 0.2 (see Table 3 on page 10).

The test results indicate that a steel composition containing nitrogen $< 0.006\%$ can be annealed at a lower temperature (670°C) and produce steel having excellent drawability characteristics and a grain index > 10 , as compared to steel compositions with $N > 0.006\%$, which cannot be fully recrystallized at 670°C and produces steel with poor drawability and having too coarse a grain with a grain index < 10 .

6. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are

believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

7. Further deponent saith not.

Munday.
Signature

17th of December 2003
Date